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Article (Published Version)

Wilsdon, James (2014) The past, present and future of the Chief Scientific Advisor. *European Journal of Risk Regulation*, 2014 (3). pp. 293-299. ISSN 1867-299X

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# The Past, Present and Future of the Chief Scientific Advisor

James Wilsdon\*

At the end of August 2014, scientists and policymakers from forty-eight countries gathered at the Heritage Hotel in Auckland, New Zealand to debate the science and art of scientific advice.<sup>1</sup> Jointly hosted by Sir Peter Gluckman, chief scientific advisor to the Prime Minister of New Zealand, and the International Council for Science (ICSU), the Auckland summit was the largest ever meeting of its kind, attracting science advisors, advisory bodies and academic experts from Albania to Zimbabwe, and a host of countries in between.

Over two days of intense discussion, participants debated structures and methods for the provision of scientific advice in emergency situations, across national and disciplinary boundaries, and on contested topics, where science, values and politics collide. The meeting ended with a call to strengthen collaboration between advisory systems, an agreement to formalize the network, and a commitment to meet again in 2016. As Sir Peter Gluckman said afterwards: "Our goal was to start a global conversation on the practices and challenges of conveying science advice to governments...The meeting has highlighted a real thirst among practitioners to share models and lessons."<sup>2</sup>

Several speakers at the Auckland summit emphasised the need to respect the diversity of different advisory systems. But the meeting also reflected a growing enthusiasm in certain quarters for the chief scientific advisor (CSA), as a particular institutional remedy to the challenge of strengthening the interface between science and policy. For European observers of these debates, the Auckland meeting was timely, coming just weeks after a high-profile controversy erupted about the merits or otherwise of reappointing a CSA to the President of the European Commission; a post which was first created in 2012, and is now up for renegotiation, as part of Jean-Claude Juncker's new Commission.<sup>3</sup>

This paper explores the evolution of the CSA role, from its origins in the US and UK, to its increasing popularity in other national and international contexts. It distils some of the lessons learned in recent years about the strengths and limitations of the CSA model. And it reflects on what the recent argument over a European Commission CSA reveals about the politics and prospects for scientific advice.

## I. The scientific states we're in

Scientific advice has never been in greater demand; nor has it been more contested.<sup>4</sup> From climate change to cyber-security, poverty to pandemics, food technologies to fracking, the questions being asked of scientists, engineers and other experts by policymakers, the media and the wider public continue to multiply. At the same time, the authority and legitimacy of these experts is under increasing scrutiny, particularly in the wake of controversies over particular technologies and episodes such as 'Climategate'.<sup>5</sup>

Across many governments and international institutions, the arrangements and methods for scientific advice and evidence-informed policymaking are being actively debated, and in some cases, new structures are being established. In recent years, New Zealand and the European Commission are among

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1 Details of the Auckland summit can be found at: <http://www.globalscienceadvice.org/>. The author was a member of the conference organizing committee.

2 <http://www.icsu.org/news-centre/news/top-news/science-advice-to-governments-comes-of-age-at-auckland-conference>

3 See e.g. Doug Parr, "The EU needs good science policy. But does that mean it needs a Chief Scientific Adviser?", *The Guardian*, 29 August 2014 <http://www.theguardian.com/science/political-science/2014/aug/29/the-eu-needs-science-policy-but-does-that-mean-it-needs-a-chief-scientific-adviser>

4 Wiebe E. Bijker, Roland Bal and Ruud Hendriks, *The Paradox of Scientific Authority: The Role of Scientific Advice in Democracies*. (Cambridge, Mass: MIT Press, 2009)

5 Mike Hulme, *Exploring Climate Change through Science and in Society* (London: Routledge, 2013)

those to have appointed their first chief scientific advisors<sup>6</sup>; countries such as Finland and Japan are currently reviewing the organization of their systems<sup>7</sup>; at an international level, fresh expert assessments are underway, such as IPBES (the Intergovernmental Platform on Biodiversity and Ecosystem Services)<sup>8</sup>; and new advisory committees have been established, for example a Scientific Advisory Board to the United Nations.<sup>9</sup>

Institutions for scientific advice reflect distinctive cultures and traditions of decision-making; what Sheila Jasanoff has termed the 'civic epistemologies' through which expert claims are constructed, validated or challenged in a given society.<sup>10</sup> As Jasanoff argues, "good science in public decision-making cannot be divorced from deeper reflection on the ways in which democracies should reason". But within this diversity, four structures stand out as most commonly used, often in combination, across particular systems:

- **Advisory councils:** many countries have a high-level council for science (or science and innovation) policy. Members typically include senior scientists, alongside representatives of industry, higher education and civil society. Examples include Japan's Council for Science, Technology and Innovation (CSTI), the UK's Council on Science and Technology, and the US President's Council of Advisors on Science and Technology (PCAST). In Australia, chief scientist Ian Chubb recently announced that he plans to establish a new science council to advise government on policy.<sup>11</sup>
- **Advisory committees:** most governments also rely on an array of specialized scientific and expert committees, which can address detailed technical and regulatory issues in areas such as health, environment and food safety. For example, the US and Japan have hundreds of such committees; the UK has over seventy.
- **National academies, learned societies and networks:** A growing number of national academies are active in science policy, and in economies such as Canada, China, Germany, Netherlands, South Africa, US and UK, academies are an important source of scientific advice. Furthermore, networks of national academies such as the International Council for Science, with a membership of 121 national bodies, representing 141 economies, and 31 International Scientific Unions,<sup>12</sup> and the InterAcademy Panel, the global network of science acad-

emies from 107 economies<sup>13</sup> are actively involved in science for policy processes at the international level (see Annex 1).

- **Chief scientific advisors:** the US appointed its first presidential science advisor in 1957, followed seven years later by the appointment of the first cross-government chief scientific advisor (CSA) in the UK. CSAs have also been appointed in Australia, Cuba, Czech Republic, India, Ireland, Malaysia, New Zealand and at the European Commission. In the UK, additional SA roles have been added gradually since 2002, and there is now one in every government department (DSAs). New Zealand is also adopting a DSA model.

None of these structures is perfect, and governments typically rely on two or more of them in combination to create a broad ecosystem of expertise around policy processes. In the UK, there is a clear hierarchy, with the government chief scientific advisor as the most senior figure. In the US, while the presidential science advisor is also crucial, the system is more decentralized, with multiple points of entry and less attempt at central coordination. Despite the diversity that we see, common challenges persist across all systems: how to protect the independence of advice while ensuring that it is listened to; how to develop a trusted relationship with policymakers, while maintaining transparency and accountability in the eyes of the public and the science community alike; and how to undertake appropriate quality assurance.

## II. The science of scientific advice

Looking across these diverse systems, we see an emerging body of best practice and analysis of what

6 See: <http://www.pmcsa.org.nz/>;  
[http://ec.europa.eu/commission\\_2010-2014/president/chief-scientific-adviser/index\\_en.htm](http://ec.europa.eu/commission_2010-2014/president/chief-scientific-adviser/index_en.htm)

7 <http://www.theguardian.com/science/political-science/2014/aug/29/crisis-renewal-and-the-prospects-for-science-advice-in-japan>

8 <http://www.ipbes.net/>

9 <http://www.sab-2014-berlin.de/>

10 Jasanoff, S. (2005) *Designs on Nature: Science and Democracy in Europe and the United States*, Princeton University Press

11 <http://www.theguardian.com/science/2014/aug/17/australias-chief-scientist-tells-pms-business-adviser-to-stick-to-economics>

12 <http://www.icsu.org/about-icsu/about-us>

13 <http://www.interacademies.net/Academies.aspx>

works (or doesn't) in particular contexts. How far can we go towards defining and codifying a 'science of scientific advice'? This question was debated by participants at the Auckland meeting, and several common challenges were identified:

## 1. How to meet the demands and rhythms of the policy process

Debates about scientific advice often focus on the 'supply-side' of the science-policy interface. But the 'demand-side' is equally important: an effective advisor needs a sophisticated understanding of how policymaking processes work, and the pressures and constraints under which ministers, civil servants and decision makers operate.

Policy challenges arise across different time horizons, requiring very different responses. Modes of scientific advice that are most useful in emergency situations will rarely be the same as those required for long-term foresight or horizon scanning. Over the past decade, advisory bodies have had to navigate a number of crises with scientific dimensions. Examples include SARS, bird flu, the Great East Japan earthquake and tsunami, the Christchurch earthquake, hurricanes, flooding and the volcanic ash cloud over Europe. As a result, countries such as Japan, New Zealand and the UK now have improved protocols for scientific advice in emergencies.<sup>14</sup> A key part of this involves communicating to the wider public, where providing clear advice, while acknowledging areas of scientific uncertainty, are the hallmarks of mature crisis management.

Some structures, such as national academies, are better suited to providing formal advice against a longer time horizon, typically by convening expert panels and producing detailed reports. Others, such as chief scientific advisors, may find it easier to provide rapid, informal advice in emergencies, by gathering inputs from a range of sources or forming *ad*

*hoc* working groups. Responding to the different rhythms of policymaking, and striking the right balance between formal and informal inputs, are crucial aspects of effective scientific advice.

## 2. The need to distinguish between 'science for policy' & 'policy for science'

In many systems, advisors or advisory bodies combine a responsibility for the use of scientific evidence in policymaking ('science for policy') with a role in determining the budgets and structure of the research and innovation system ('policy for science'). The lines between these can easily become blurred, not least because areas of 'science for policy' will have implications for particular research priorities or the funding structure. However, where possible, it is often useful to keep the two roles distinct, to avoid limiting the advisory remit by being seen primarily as a lobbyist for resources for science.

Given their proximity to the scientific community, it can be a challenge for scientific advisors to extend the same commitment to impartial evidence to the management of the research system that they bring to other areas of policy. But it can be done: former US presidential science advisor John Marburger won plaudits for his willingness to ask tough questions about the evidence base for research funding in a 2006 speech, which led to the creation of the National Science Foundation's programme on the 'science of science and innovation policy'.<sup>15</sup> Such efforts should focus not only on the economic case for research funding, but also on its social and public value, and on opening up debates about research priorities to more diverse perspectives.<sup>16</sup>

## 3. The need for advisers to act as intermediaries, brokers and communicators

Scientists are typically appointed as advisors or expert committee members because of their deep expertise and standing in a particular field of research, but (except in technical committees) they may only rarely be asked to provide advice which draws on their narrow area of expertise. More often, their role is to act as intermediaries, able to translate, aggregate

14 See e.g. <https://www.gov.uk/government/groups/scientific-advisory-group-for-emergencies-sage>

15 <http://www.scienceofsciencepolicy.net/reference/marburger-speech-aaas-forum-science-and-technology-policy>

16 Rafols, I., Ciarli, T., van Zwanenberg, P. and Stirling, A. (2012) 'Towards indicators for "opening up" science and technology policy' <http://microsites.oii.ox.ac.uk/ipp2012/sites/microsites.oii.ox.ac.uk/ipp2012/files/Rafols-Ciarli-OpeningUp-FULL.pdf>

and synthesize varied perspectives and sources of evidence.<sup>17</sup>

Roger Pielke Jr. identifies several roles that scientists can play in policymaking, and suggests that the most crucial of these is the 'honest broker', who is able to help decision makers to choose wisely between the available options on a given topic.<sup>18</sup> Ottmar Edenhofer, who recently co-chaired Working Group III of the Intergovernmental Panel on Climate Change, offers a related metaphor of the scientific advisor as a 'cartographer' or 'map maker' of policy paths.<sup>19</sup> It is important for advisors to be clear when they are moving from 'honest broker' mode into more explicit advocacy of a particular policy position (as inevitably happens from time to time), as a failure to do so can undermine trust.

Another aspect of a scientific advisor's intermediary role is to look beyond the scientific content of a particular issue and communicate the broader methodological principles and concepts that underpin scientific evidence. William Sutherland and colleagues suggest twenty key points (such as 'no measurement is exact', 'correlation does not imply causation' and randomization avoids bias') that policymakers and the wider public should bear in mind when interpreting scientific claims.<sup>20</sup>

#### 4. The obstacles to resolving conflicts of values through appeals to facts

Scientific advisors and advisory bodies spend a lot of their time engaged in debates that reflect what some have dubbed 'post-normal science': where facts are uncertain, values are in dispute, stakes are high and decisions are urgent.<sup>21</sup> Arguments over climate change and GM crops are two obvious examples, but there are many others.

Any issue where science is an important factor, but where values, ethics and politics are also in tension, is unlikely to be resolved through a simple statement of the scientific evidence.<sup>22</sup> To assume a linear relationship between evidence and policymaking is often a mistake, and advisors need to recognize the many ways in which evidence, values and political judgments combine to produce decisions. As Sir Peter Gluckman argues, this is not to deny that science 'should hold a privileged place' among the types of knowledge that may be meaningful to policymakers, but this privilege is fragile and depends on not over-

stating what is known, and on acknowledging scientific limits and uncertainties.<sup>23</sup>

#### 5. An increased reliance on multidisciplinary & interdisciplinary expertise

There is a growing recognition across advisory systems that identifying solutions to cross-cutting policy problems will require input not only from natural scientists, but also from engineers, social scientists and other experts. For example, in the UK, it is now accepted that social scientists should form part of the network of departmental chief scientific advisors, and the Parliamentary Office for Science and Technology recently established a social science section.<sup>24</sup> Some argue for 'chief social scientists' or 'chief historians' to be appointed alongside chief scientists, but creating separate structures ducks the more important challenge of how to integrate an appropriate mix of advice and evidence from a wide range of disciplines.<sup>25</sup>

In this context, it is helpful to distinguish between *multidisciplinarity*, which is usually about building better links between different disciplines, each of which continues to rely on its usual methods and modes of enquiry, and genuine *interdisciplinarity* which encourages various disciplines to cross subject boundaries, thus enabling, as Andy Stirling argues,

- 17 Mulgan, G. (2013) 'Experts and experimental government' in Doubleday, R. and Wilsdon, J. *Future Directions for Scientific Advice in Whitehall*. London: Alliance for Useful Evidence/CSaP
- 18 Pielke, R. Jr. (2007) *The Honest Broker: Making Sense of Science in Policy & Politics*, Cambridge University Press.
- 19 Edenhofer, O & Minx, J. 'Mapmakers and Navigators, Facts and Values' *Science*, 4 July 2014: Vol. 345 no. 6192 pp. 37-38. DOI:10.1126/science.1255998; <http://www.sciencemag.org/content/345/6192/37.full?ijkey=Wox6TyUVE94Ts&keytype=ref&siteid=sci>
- 20 Sutherland, W.J., Spiegelhalter, D. & Burgman, M. 'Twenty tips for interpreting scientific claims', *Nature* 503: 335, 20 November 2013
- 21 Funtowicz, S. O., and Ravetz, J. R. "Science for the Post-Normal Age", *Futures*, 25/7 September 1993, p. 739-755.
- 22 Sarewitz, D. 'How science makes environmental controversies worse' *Environmental Science & Policy*, 7 (2004) 385-403
- 23 Gluckman, P. 'The art of science advice to government' *Nature* 507: 163-165, 13 March 2014
- 24 <http://blogs.lse.ac.uk/impactofsocialsciences/2013/09/09/exclusive-look-post-social-science-section/>
- 25 Wilsdon, J. 'Too many chiefs? Experts, advisers and the disciplinary mix' *The Guardian*, 15 March 2013 <http://www.theguardian.com/science/political-science/2013/mar/15/science-policy>



'more radical interactions between different styles of knowledge, fostering potentially transformative solutions.'<sup>26</sup>

Similarly, effective advisory systems now draw their evidence from a wide range of methods, including scientific studies, randomized controlled trials, statistical data, socioeconomic models and forecasts, opinion polls, observational studies, and more qualitative modes of social analysis and public engagement. The growing availability of online 'big data' also has the potential to supplement and enrich existing methods.

Approaches to scientific advice that draw on a more diverse range of disciplinary and methodological inputs may in turn lead to less emphasis on reaching a 'consensus', which may obscure legitimate scientific disagreements and uncertainties, in favour of more 'plural and conditional' modes of advice. Andy Stirling points to the way the UK Bank of England's Monetary Policy Committee reaches decisions on interest rates, with differences of opinion among expert members made public and their rationale openly discussed, and asks why scientific advisory processes can't operate on a similar basis?<sup>27</sup>

## 6. The need to link scientific advice to wider developments in evidence-informed policymaking

In a number of countries, governments are showing a renewed enthusiasm for evidence-based policy and more 'experimental' approaches to policymaking, in which scientific methods, such as randomised control trials, are used to inform policy options.<sup>28</sup> Exam-

ples include a new program on evidence and policy in the Chinese Academy of Sciences, a new behavioural sciences unit in the US Office of Science and Technology Policy, and a UK government network of 'What Works' evidence centres.<sup>29</sup> A resurgence in the field of intervention research has seen it move beyond health and human services into new areas of policy testing as well.

These efforts are often being driven from the demand side by policymakers and civil servants, and may operate separately from structures for scientific advice. But the synergies between these agendas are obvious, and scientific advisory bodies should position themselves at the forefront of this agenda.

## 7. Opportunities to link science policy research more closely to practice

Geoff Mulgan reminds us that there is 'a science as well as a craft of scientific advice', and argues that advisors need to draw more systematically on research in political science, social psychology, behavioural economics, and science policy which investigates 'why certain kinds of knowledge are acted upon, and others are not.'<sup>30</sup> This requires concerted efforts from both sides – academics and practitioners – to connect the latest scholarship to advisory processes and practices. Building and operationalizing such links was another focus of the Auckland meeting.

In a recent essay, Sheila Jasanoff distils insights that can be drawn from three decades of research in the field of science and technology studies (STS). She acknowledges that the questions raised by STS sometimes can be 'associated with unproductive wheel-spinning and relativism', but insists that 'the wheels, in my view, can spin with traction.' In democracies, no institutions should place themselves beyond critique: 'If judges may not presume to stand above the law, still less should science advisers seek to insulate themselves from the critical gaze of the science of science advice.'<sup>31</sup>

## 8. The need to strengthen exchange and learning across different systems

The primary aim of the Auckland conference was to improve the exchange of ideas, lessons and best practices across different advisory systems. Other such

26 Stirling, A. 'Disciplinary dilemma: working across research silos is harder than it looks' *The Guardian*, 11 June 2014 <http://www.theguardian.com/science/political-science/2014/jun/11/science-policy-research-silos-interdisciplinarity>

27 Stirling, A. 'Keep it complex' *Nature* 468: 1029-1031, 23/30 December 2010

28 Sabel, C.F. and Zeitlin, J. (2012) 'Experimentalist governance' in Levi-Faur, D. (Ed.) *The Oxford Handbook of Governance*. Oxford: Oxford University Press.

29 <https://www.gov.uk/government/publications/what-works-evidence-centres-for-social-policy>

30 Mulgan, G. 'Experts and experimental government' in Doubleday, R. and Wilsdon, J. *Future Directions for Scientific Advice in Whitehall*. London: Alliance for Useful Evidence/CSaP, April 2013

31 Jasanoff, S. 'The science of science advice' in Doubleday, R. and Wilsdon, J. *Future Directions for Scientific Advice in Whitehall*. London: Alliance for Useful Evidence/CSaP, April 2013

meetings do take place, including the Carnegie Group of Science Advisors, which was established in 1991 to enable science ministers and advisors from the G8 (now G8+5) nations to meet annually. But the Auckland meeting was an ambitious response by the New Zealand government and the International Council for Science (ICSU) to calls for a more open and inclusive global forum for such discussions.<sup>32</sup>

There are links here to wider agendas around 'science diplomacy' and collaboration in pursuit of shared science policy goals. The OECD's Global Science Forum is also leading an ongoing project to examine and strengthen scientific advisory systems, which will report in 2015.<sup>33</sup> Given the timeliness of these debates, Auckland hopefully represented the start of a broader conversation. Follow-up summits on scientific advice are already planned in the UK in 2016 and in Japan in 2018. Every system can benefit from a process that brings together advisers, policy-makers, practitioners, experts and others on a regular basis to reflect on progress, share ideas and chart future agendas for the '(art) and science of scientific advice'.

### III. Future directions for scientific advice in Europe

The Auckland summit was particularly timely for discussions over the future of scientific advice in Europe. Over the summer of 2014, a war of letters raged between critics and supporters of the post of a CSA to the President of the European Commission. The incumbent, Professor Anne Glover, who was the first person to occupy the role, is due to stand down at the end of October 2014, as part of the transition from the Barroso to Juncker presidencies, and it is not yet clear whether the role will be renewed.

Anne Glover does not disguise the difficulties she has experienced in embedding the new role of a CSA within existing Commission structures. In a frank and passionate speech at the Auckland summit on '1000 days in the life of Chief Scientific Adviser', she gave an account of the progress she has made since 2012, and the problems that persist. One of the highlights of her last six months in office has been the launch of a new network of scientific advisers from twelve EU member states.<sup>34</sup> But priorities for her successor (assuming one is appointed) will include securing better resources for the CSA (Glover current-

ly has a team of four staff), and ensuring that her office is better connected not only to the Presidency, but also to the Joint Research Centre and other parts of the Commission with capabilities and resources to support evidence-informed policymaking.

Sitting above these institutional challenges is a bigger political question around whether the European Commission & Parliament can find better ways of separating evidence-gathering processes from what Glover terms the "political imperative". She has called in recent months for the creation of a central "evidence service" within the Commission, working with the CSA to assess all policy proposals in light of the best available science. Such a function could potentially be housed within the Joint Research Centre, which has repositioned itself over recent years as an analytical and evidence-gathering resource for Commission-wide policymaking.

These debates received a surprising burst of public and media attention over the summer of 2014, when a group of environmental NGOs wrote a strongly-worded letter to Juncker calling for the CSA role to be scrapped. The letter argued: "The post of CSA is fundamentally problematic as it concentrates too much influence in one person, and undermines in-depth scientific research and assessments carried out by or for the Commission directorates in the course of policy elaboration." This intervention then prompted a flurry of letters in response from scientific bodies, research funders and business groups, all of whom spoke up in support of the CSA role.

President Juncker has said that he will revisit the question of how best to organize and source scientific advice for the Commission once he formally takes up office in November 2014. Notwithstanding complaints from Greenpeace and others, there is a strong likelihood that the CSA role will be renewed, but Juncker will hopefully also take this as an opportunity to address the structural and resourcing challenges that Anne Glover has identified over recent months. CSAs are not superheroes – they can't singlehandedly cut through the messiness and contestation that so often occur when science, politics and policy col-

32 e.g. Doubleday, R. & Wilsdon, J. 'Beyond the great and good', *Nature* 485 : 301-302, 17 May 2012

33 <http://www3.grips.ac.jp/~gist/en/events/ws20131022.html>

34 <http://www.theguardian.com/science/political-science/2014/jun/23/evidence-based-union-a-new-alliance-for-science-advice-in-europe>

lide. But with proper support, sufficient resources and appropriate protocols around independence and transparency of advice, they can make a positive difference, as we see from a growing number of advisory systems around the world. More than anything else, CSAs act as a magnifying device, able to draw

on a much wider and more distributed ecosystem of expertise, and focus its contribution in a way that is timely, relevant and useful to the policy process. It is in the interests of all those who see evidence as vital to effective policymaking that the role of Europe's CSA should survive into 2015 and beyond.